Introduction

Automated breast volume scanner (ABVS) [1]
- Designed for screening with ultrasound (US)
- Creates stacks of continuous US images covering the entire breast
- Operator-independent
- Suitable for dense breasts

Ultrasound elastography
- Imaging method based on lesion stiffness (malignant lesions are stiffer than healthy breast tissue)
- Can be used as add-on to gray-scale ultrasound to improve specificity for cancer detection [2]
- So far not available for ABVS

Objective

Development of 3-D ultrasound elastography for ABVS to improve breast lesion classification

Material and Methods

- Two ABVS scans of the breast at different rates of deformation
- Analysis of raw ultrasound data to estimate the tissue stiffness
- Validation in breast elastography phantom
- Feasibility evaluation with initial patient studies

Results

Elastographic breast phantom

In-patient: invasive ductal carcinoma

Discussion

3-D ultrasound elastography is feasible for ABVS
- Verified by phantom and initial in-patient results
- Expected to improve specificity of ABVS [2]
- Operator-independent elastography
- Relatively easy to implement in clinical routine
- Allows simultaneous reading of elastographs and B-mode

Future steps:
- Automated acquisition of pre- and post-deformation scans
- Patient study to determine clinical value
- Reduce breathing artifacts by ultrafast ultrasound imaging
- In-house-developed ABVS prototype demonstrates that this might be possible [3]

Conclusion

An operator-independent 3-D breast ultrasound elastography method was brought from bench to bedside, in order to improve specificity of the ABVS system.